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LaserTower™ Bullet Master™

The LaserTower™ Bullet Master™ 3D Marking and Engraving System is an industrial-grade next-generation material processing system supporting all major bullet standards and calibers.

LaserTower™ Bullet Master™ is the most flexible 3D mil-grade bullet cartridges marking and engraving system designed to perform under high-vibration, shock and dust conditions. The LaserTower™ Bullet Master™ complies with the NATO Standard Agreement (STANAG) 2310, 2329, 4090, 4172, and 4383.

Please specify the cartridge standard while ordering LaserTower™ Bullet Master™ is optimized per our customer's unique application as seen in chart.
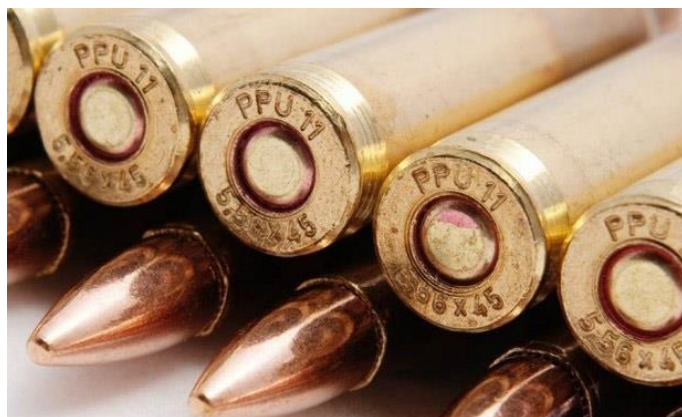
Inch caliber	Metric caliber	Typical bullet diameter
.20, .204	5 mm	0.204 in
0.22	5.56 mm	0.220–0.224 in (5.6–5.7 mm)
0.24	6 mm	0.243 in
0.25	6.35 mm	0.25 in, 6.35 mm
0.27	6.8 mm	0.277 in, 7.035 mm
0.28	7 mm	0.284 in, 7.213 mm
.303, .31	7.9 mm	0.31–0.312 in (7.9–7.9 mm)
0.338	8.6 mm	0.338 in
0.357	9 mm	0.355–0.357 in (9.0–9.1 mm)
0.4	10 mm	0.400 in
0.44	10.9 mm	0.429 in
0.45	11.43 mm	0.450 in
0.5	12.7 mm	0.510 in (12.95 mm)
.30, .308	7.8 mm	0.308 in
0.26	6.5 mm	0.264 in, 6.7 mm
0.323	8 mm	0.323 in

The LaserTower™ Bullet Master™ is designed with either a Fiber Laser or CO² Laser with wattages ranging from 20W to 100W. The LaserTower™ Bullet Master™ provides an oversized enclosure, supporting both circumferential marking & flat marking applications. All Direct Parts Marking (DPM), including UDI/UID barcodes, logos and engravings are permanent, legible and non-removable across the largest range of materials in the industry. The LaserTower™ Bullet Master™ incorporates Fonon's proprietary FiberScan™ C3 Software designed to specifically serialize, embed service marks, or barcodes to the large variety of weapon ammunition, like bullet cartridges, missiles, bomb shells, mines, etc…

The LaserTower™ Bullet Master™ is an industrial-grade, 3D Marking & Engraving System incorporating a programmable 8" Z-axis for focal height adjustments with 2 optical X'Y' axes

and a portfolio of lens options that incrementally increases the range of the marking area from 2" x 2" to 12" x 12". The LaserTower™ Bullet Master™ incorporates a movable Rotary Indexer and is optimized for a Fiber Laser or Fantom SLAB CO_2 Laser, Scan Head, Industrial PC Controller and Power Supply. The LaserTower™ Bullet Master™ incorporates the latest FiberScan™C3 Software designed to run on all Windows Plataforms. The LaserTower™ Bullet Master™ processes the largest range of materials in the industry with special attention to highly-reflective metal applications.

Mil Standard Applications: The LaserTower™ series produce a wide variety of Permanent, Legible, Non-Removable Marks on a wide variety of weapons an ammunition.		
Applications and Types of Marks	Caliber	Standard
Marking	All	YES
Engraving	All	YES
2D UDI/UID Barcoding	All	YES
Part Numbering	All	YES
3D Engraving/Deep-Engraving	All	YES
Surface Texturing	All	YES
Sequential Serial Numbers Lot Codes and Date	All	YES
Codes	All	YES
Service Marks	All	YES

LaserTower™ Bullet Master™ Design: Main Features

❖ Maintenance-Free Direct Part Marking (DPM)

❖ Continuous operation under high-shock, vibration and dust conditions

❖ Long-term industrial-grade reliability with 50,000 hours MTBF

❖ Standard wall plug operation with high electrical efficiency

❖ Low voltage power source (110/220 VAC) 8 amps

❖ Laser "ON" magnetically locked front doors for operator safety

❖ Oversized chamber provides working area for larger parts

❖ Class 1 or Class 4 Laser-Rated Safety Viewing Port

❖ PC-Based Controller, Flat Panel Monitor, Mouse and Keyboard

❖ Industrial-grade Extruded Frame with 19" Rack Mount Design

❖ Removable Rotary Motor for circumferential marking

❖ Exhaust outlet for Fume Extractor

☑ Fiber Laser: 20W-30W-50W Options

Fiber Lasers are a great leap forward in processing all metal and coated soft material applications. Our Fiber Lasers are easily integrated into industrial processes in comparison with conventional lasers due to:

- State of the art, Air-cooled, Ytterbium Q-switched Fiber Laser up to 2mJ for marking on virtually any material
- CW or Q-switched Fiber laser options with high-repetition rate
- Excellent TEM00 beam quality (M2 < 1.05)
- Exceptional High Reliability with more than 30,000 hours estimated maintenance-free operation
- Very high 50,000 hours MTBF (100,000 hours typical on diodes)
- Flexible cable-beam delivery system
- No water cooling required
- Optimized for Direct Part Marking (DPM) applications including UDI/UID Barcoding and 3D Deep Engraving

☑ Q-Switched Fiber Laser

The Q-switched Fiber Laser is maintenance-free. It delivers an excellent diffraction-limited (TEM00 beam quality M2 < 1.05) laser beam directly to the worksite via a metal sheathed single-mode fiber cable. These compact service-free Fiber Lasers are designed to operate under high-shock, vibration and dust conditions in relatively high humidity across wide operating temperature ranges. State-of-the-art air-cooled Ytterbium lasers have a very high MTBF of 50,000 hours (100,000 hours typical on diodes). There is no routine replacement of parts or materials scheduling requiring only a low voltage power source. Fiber-to-Fiber architecture provides a robust, monolithic design with no optics to align, no mechanics to stabilize. The laser is engineered for optimal power and density providing responsive performance for the most demanding applications.

☑ Fantom CO_2 SLAB Laser: 30W-100W Options

These CO_2 lasers are easily integrated into industrial processes in comparison with conventional lasers due to:

- Designed to operate under high shock, vibration & dust conditions
- Sealed off and RF Excited CO_2 SLAB laser
- CW or Pulsed CO_2 laser options
- Excellent TEM_{00} beam quality (M2 < 1.2)
- Exceptional Reliability with more than 10,000 hours maintenance-free operation
- Sealed dust-proof design
- No need for gas refill during the warranty period
- Flexible cable-beam delivery system

- No water cooling required
- Optimized for Direct Part Marking (DPM) applications including UID/UDI barcoding and engraving
- Red diode pointer for easy application setup (Optional)
- Warranty – 2 years on laser components with 5 years optional program

☑ Fantom F30/F100 CO² SLAB Laser

Fantom F30/F100 CO² Slab Lasers are completely sealed units requiring no gas connections producing a beam that processes material at an average power of 30W/100W respectively. These CO² lasers provide a low M2 (<1.2), high quality beam that allows smaller focus spot sizes and incorporates Laser Photonics proprietary fast-rising square wave pulsing technology with repetition rates up to 25 kHz with an output wavelength of 10.6 microns.

☑ Scanning Head

The Scan Head is designed to quickly and precisely deflect and position laser beams with powers up to the kilowatt range. With apertures of 20mm and 25mm, small spot sizes are achieved along with large image fields. Very stable operating conditions as well as high long-term stability are provided by air cooling of the entrance aperture, electronics, and galvanometer scanners and supplemented by air cooling of the deflection mirrors. The compact housing is dust proof and water spray resistant.

Dynamic Performance Facility Requirements	
Repeatability:	< 22 µrad Operating Temperature 25°C±10°C
Offset Drift:	< 25 µrad/k Typical Air Requirements Clean, Filtered air 20 l/min. at Δp <2bar
Gain Drift:	< 80 ppm/k
Long Term Drift:	< 0.3 mrad (Over 8 hours)
Tracking Error:	0.40 ms

Optical Performance	
Focal Length:	100 – 200MM Typical Scan Angle of Scanner 1 ±0.26 rad
Zero Offset:	< 5 mrad Typical Scan Angle of Scanner 2 ±0.40 rad
Skew:	< 1.5 mrad Typical Field Size – Ellipse 80mm x 130mm
Nonlinearity:	< 2.1 mrad Typical Field Size – Square 75mm x 75mm to 110 x 110mm
Gain Error:	< 5 mrad

☑ Vibration Bowl Feeder

Bullet Cartridge   bowl feeders automatically sort, feed and transfer single parts over a vibrating rail. At the end of the rail is a separator station that separates a single part. The separated part is sliding into the marking area alone the guide. Bowl feeders are fitted with a fill level sensor and can be automatically replenished by a hopper or manually. This system will satisfy the throughput rate of 9000-9500 bullets per hour in correlation with the ammunition caliber and marking requirements.

☑ Fiber laser

State-of-the-art, Air-Cooled, Ytterbium Q-Switched Fiber Laser for marking on virtually any material (metals, plastics, ceramics; etc.)

- This Marking Kit has two scanning heads working simultaneously (master-slave configuration) which doubles the speed of the marking process. This could be very useful for marking a large quantity of parts with the same pattern.
- Integrated Design with laser, laser control and power supplies in one box for each of the two scan heads
- Designed for maintenance-free Direct Part Marking (DPM) applications
- PC with user-friendly software supplied
- Excellent beam quality (M2=1.4)-TEM00 beam profile
- Greater than 50,000 hours maintenance-free operation
- Low voltage power source (110/220 VAC) requirements
- Flexible cable beam delivery system

Standard configuration includes:

- Two iSeries Fiber Lasers integrated with Scan head Power (or dual heads)
- Two Digital Scanning Heads
- Two F-Theta Lenses with 330 mm Focal Length
- Industrial PC based laser units are designed to mount into standard Industrial 19" rack
- Laser Controller 4U shell assembly
- Mounting Hardware and Cables
- Optical Fiber Cable 3 meters
- FiberScan Software
- Flat panel monitor, mouse and keyboard
- Red aiming beam and Red diode pointer for easy set-up and alignment
- External interlock

Optional configuration includes:

- Digital Scanning Head with 7, 10, 14, 20, 25, 30 mm Mirrors
- F-Theta lens with 68, 100, 160, 254, 330 and 420mm
- Remote control interface for all components
- Beam shaping optics for smaller beam size
- Optical isolator

☑ PC-Based Controller

The PC-Based Controller is an industrial-grade PC in an open and upgradeable configuration incorporating the latest generation mother board and data storage devices. The controller also includes an advanced Scan Head Digital Control Board and optically isolated I/O card. The unit operates on Windows 2000 Professional and Windows XP Professional with optional field correction software for demanding applications.

☑ DSP Control Board

The PC Interface DSP Control Board provides synchronous, interference - resistant control of the scan system and laser in real time. A high performance signal processor and the supplied DLL simplify programming under Windows. Software instructions are loaded alternately in two list buffers processed by the DSP and output as 16-bit control signals every 10μs to the scan system. The processor automatically performs vital steps such as micro-vectorization and image field correction. Laser control is synchronized with the scanner movements.

Interface:	PCI bus interface
Resolution:	16-bit positioning resolution
Output Period:	10 μs

☑ Precise, Maintenance Free Z-Axis Controller

The Z-Axis Controller with an 8" vertical capability accommodates a variety of field replaceable lenses. Made of stainless-steel construction with contact free home and positioning sensor along with a life lubricated preloaded linear slide with dust protected way cover.

☑ Precise, F-Theta Lens Options
100mm - 160mm - 254mm - 330mm - 420mm

☑ Rotary "C"-Indexer for Circumferential Marking
Options Include 3", 4" or 5" Self-Centering Chucks

☑ Tail Stock Support (option)

☑ Touch Screen Interface

☑ IR Laser Beam Red Diode Pointer

☑ Light Barriers (option)

☑ Dual Push Buttons for Safe Operation (option)

☑ Precision Linear Bearing Tracks
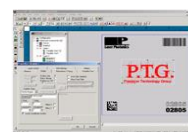
For Rotary Indexer and Tail-Stock Support

☑ Auto Focus Laser Height Sensor with Controller and Software
- Small-spot, Definite-Reflective Type
- 50 µm Spot Diameter
- Maximum Detection range of 150 mm
- High-speed Response and Digital Display
- High-Power Mode with 16-Bit High Accuracy
- Reading on Transparent and Solid Surfaces

☑ Host Communication/Database Interface

☑ Vision System Recognition/Alignment System

☑ **Frame Design**: Rigid, light aluminum extrusion providing excellent protection of equipment corners and rigid, stiff design for long term stability.

☑ **Skins Design**: New modern 3 layer laminate: Aluminum, plastic, aluminum. Powder coated for industrial durability providing excellent protection for laser radiation according to CDRH requirements.

☑ **Transparent Protective Window**: CDRH rated yellow transparent laser rated acrylic window for visualization of lasing processes and easier alignment.

☑ **Equipment and Facility Specifications**

Maximum Material Size	Without Rotary Indexer: [787 mm (W) x 482 mm (D) x 254 mm (H)] [31 inches (W) x 19 inches (D) x 10 inches (H)] With Rotary Indexer: [482 mm (W) x 482 mm (D) x 203 mm (H)] [19 inches (W) x 19 inches (D) x 8 inches (H)]
Laser Equipment	Fiber Laser: LPQ 20-1.0, LPQ 30-1.0, LPQ 50-1.0, CO_2 Laser – Fantom F30, Fantom F100
Mode of operation	Q-Switched or CW (Fiber laser); Pulsed or CW (CO_2 laser)
Programmable Z-Axis	4" or 8" Travel
Rotary Indexer	3', 4"or 5" Chucks
Maximum Material Weight	120 lbs
System Dimensions	See envelope drawings below
Weight	375 pounds
Operating Temperature	+18 to +25° C
Relative Humidity	40 – 80% non-condensing
Electrical Requirements	120 volt 8 amps

| Clean Dry Air* (If Required and equipped)*	80 PSI

☑ **Operations & Maintenance Manual (in English) includes**:

Service Information – General Description – Laser Safety Manual – Schematics (Appendix A) Software Manual (Appendix B)- Operation Description - I/O Description – Troubleshoot Guide Scan head manual – Control Board Manual

☑ **FiberScan C3™ Software**

 FiberScan C3™ software is a high performance, multi-threaded laser marking solution designed to specifically run on Windows 2000 Professional and Windows XP Professional. The user-friendly software entails a fully integrated driver, remote diagnostic capabilities for worldwide support and multiple hardware interfaces for the ability to execute any CO_2 or Fiber Laser marking system. File links to several internal databases make the FiberScan C3™ program flexible and powerful.
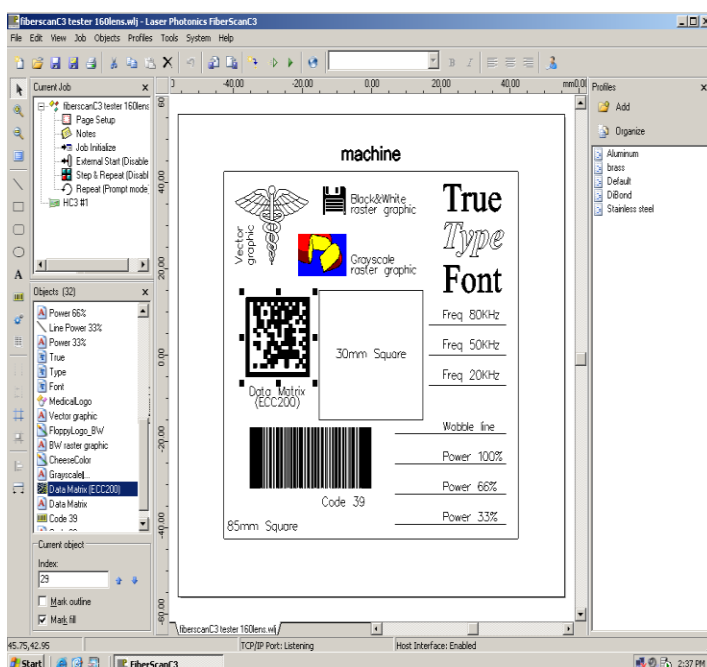
These databases include a materials application system and a fixture database. The materials application system allows a user to define a laser process, give the process a unique name and subsequently link the process to graphic programs. A process can include multiple passes using different values for power, frequency and speed on each laser pass. The database can contain and manage many thousands of different process 'recipes'.

The fixture database allows the user to control fixture offsets and define step and repeat processes. Just like the material database, any WLJ job can use any fixture defined in the fixture database. The link sallow all appropriate graphic

and process information to be automatically loaded when the operator selects the lasing file. At any time the operator can change the links, for example a lasing job that is normally marked on stainless steel, can be marked on brass by selecting the brass process file prior to executing the job program file. Operators don't have the need to remember fonts and logos for a particular job because FiberScan C3™ automatically performs all required graphic loading. FiberScan C3™ does not require users to learn any programming languages or special codes and provides all of the flexible and graphic controls that users are accustomed to such as radial marking, aspect control, character spacing, angular rotations and full justification.

☑ Other Product Applications:

Hand Held Laser Marking System

The Hand Held Fiber Laser is a safe, state-of-the-art, Direct Parts Marking (DPM) alternative for Nd:YAG and Nd:YVO4 lasers (Lamp-pumped, Side-pumped Diode, and End-Pumped Diode). Components include a Q-Switched Ytterbium Fiber Laser with Scan Head, Industrial PC Controller, Power Supply, and Marking Software.

Direct Parts Marking, UID Marking, Date Codes, Bar Codes, Time Stamps and all other permanent marks on all non-movable parts and equipment for traceability and Code Compliance purposes.

UID Marking for Small Arms and Ammunition

Identification and tracking of small arms and ammunition are certainly not new ideas. However, recently issued Department of Defense directives mandating unique identification (UID) marks and an international initiative to standardize marking, record keeping and tracing of small arms and light weapons, have those in the industry reevaluating existing processes and procedures for marking equipment.

Direct Parts Marking, UID Marking, Date Codes, Bar Codes, Time Stamps and all other permanent marks on all non-movable parts and equipment for traceability and Code Compliance purposes.

☑ LaserTower™ Bullet Master™ System Dimensions: 375 lbs

1327.60 [52.268]

2134 [84.016]

1930 [75.984]

1619.70 [63.768]
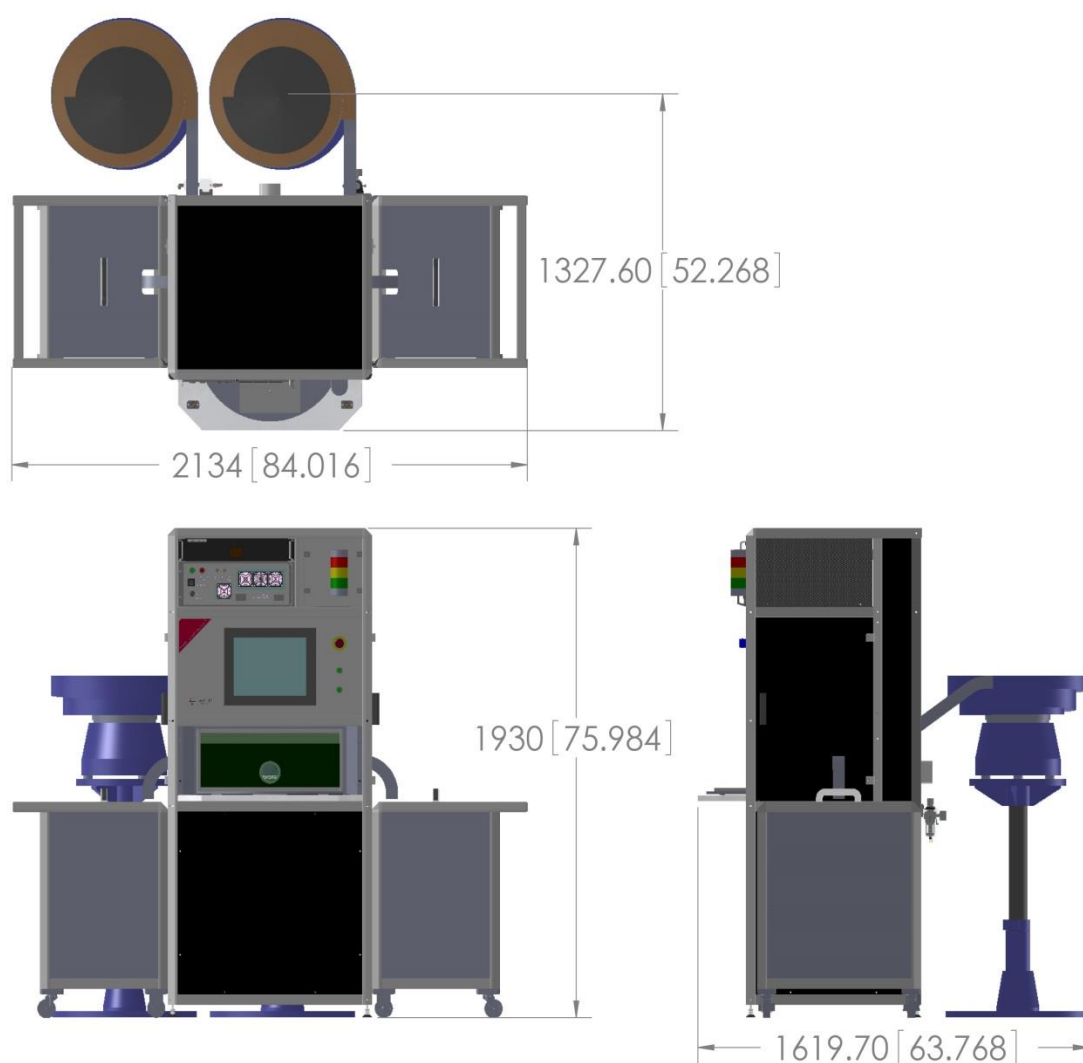
☑ Application Research Center

Laser Photonics maintains an applications lab for processing customer samples and assisting with process development. Our applications lab has the latest testing equipment to analyze all of your application needs. For marking applications, we provide the highest quality analysis of each and every mark using our Mark Quality Assessment™ (MQA™) software. With our MQA™ software, we have the ability to guarantee and verify the accuracy and quality of our marks. The screen shot demonstrates how the MQA™ software reads the level of pixels in the material marked. The section in red has been analyzed with the MQA™ software. The high and low pixel values demonstrate the overall contrast of the mark. This procedure can be applied to various different marking processes and types generated by our Fiber Laser marking systems.
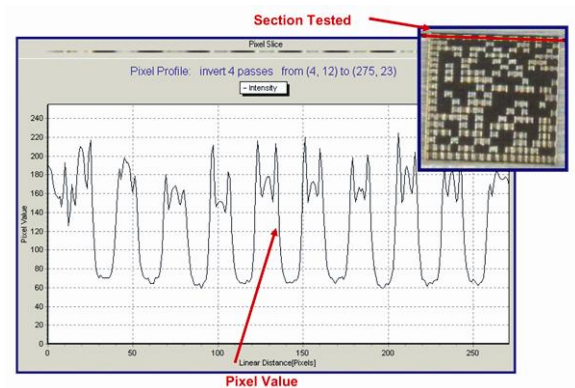
☑ Additional Available Technical Documents:

- Optional Lens Selection
- Working Distances For Different Lenses
- Full Spectrum Of Fiber Lasers Available
- Laser CCD Height Sensor Specifications
- Scan Head Drawings
- Mounting Hardware Drawings
- Component Dimensional Drawings
- IO Description
- Owners And Installation Manual

- In Line Fiber Laser Marking Kit

LaserTower™ Series Product Line

LaserTower™ DeskTop   LaserTower™ Compact   LaserTower™ Professional   LaserTower™ Professional CM   LaserTower™ Professional RT   LaserTower™ Professional DUO   LaserTower™ Professional Megacenter™

LaserTower™ Series Product Guide	LaserTower™ DeskTop	LaserTower™ Compact	LaserTower™ Professional	LaserTower™ Professional CM	LaserTower™ Professional RT	LaserTower™ Professional DUO	LaserTower™ Professional MegaCenter™
Q-Switched Fiber Laser							
0.5mJ @ 10kHz	☑	☑	☑	☑	☑	☑	☑
0.5mJ @ 20kHz	☑	☑	☑	☑	☑	☑	☑
1.0mJ @ 20kHz	☑	☑	☑	☑	☑	☑	☑
2.0mJ @ 20kHz			☑	☑	☑	☑	☑
CW Fiber Laser (50 Watts)							
50 Watts			☑	☑	☑	☑	☑
F-Theta Scanning Lenses							

	LaserTower™ DeskTop	LaserTower™ Compact	LaserTower™ Professional	LaserTower™ Professional CM	LaserTower™ Professional RT	LaserTower™ Professional DUO	LaserTower™ Professional MegaCenter™
100mm		☑	☑	☑	☑	☑	☑
160mm	☑	☑	☑	☑	☑	☑	☑
254mm		☑	☑	☑	☑	☑	☑
330mm		☑	☑	☑	☑	☑	
330mm with Beam Expander				☑	☑	☑	
420mm				☑	☑		
420mm with Beam Expander				☑	☑		

LaserTower™ Series Product Guide	LaserTower™ DeskTop	LaserTower™ Compact	LaserTower™ Professional	LaserTower™ Professional CM	LaserTower™ Professional RT	LaserTower™ Professional DUO	LaserTower™ Professional MegaCenter™
Z-Axis Controller							
Scissor Jack (Manual "Z" Axis)	☑						
Programmable 4" Z-Axis		☑	☑	☑	☑	☑	☑
Programmable 8" Z-Axis			☑	☑	☑	☑	☑
Rotary "C" Indexer					☑		

Requirements beyond those listed below will be quoted upon request. Contact Laser Photonics office or visit our website www.laserphotonics.com if you need any assistance determining which capabilities best suit your needs.
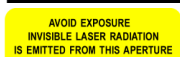
Safety Considerations During Operation: 1064 nM wavelength laser light emitted from this laser system is invisible and may be harmful to the human eye. Proper laser safety eyewear must be worn during operation at all times.

21CFR 1040.10 Compliance: Fiber Lasers are a Class 4 laser as designated by the CDRH and meet the full requirements for a stand-alone laser system as defined by 21 CFR 1040.10 under the Radiation Control for Health and Safety Act of 1968. As

an added level of security, a redundantly switched safety interlock system helps prevents accidental exposure to excess laser radiation. Plus the system is equipped with an electrical power manual reset, a key-locked laser power switch and a remote interlock connector. Finally, the system has audible and visible emission indicators with five (5) second emission delay settings. All these features, in combination, constitute the laser radiation safety system which allows the LaserTower™ Series of equipment be used in a safe and secure

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